

GENETIC STOCK IDENTIFICATION IN PACIFIC SALMON FISHERIES MANAGEMENT

Klamath River fall Chinook (KRFC) and Chinook stocks listed as threatened or endangered under the Endangered Species Act have limited salmon fisheries in recent years off the coasts of California, Oregon, and Washington, and will likely continue to limit fisheries in the future. There is hope and a growing expectation that Genetic Stock Identification (GSI) technologies will help alleviate those constraints, and a desire to begin using GSI for management as soon as possible. The purpose of this agenda item is to discuss the goal of developing a plan for evaluating and implementing GSI methods beginning in 2007.

The long-term objective is to increase the information available to managers on the temporal and spatial ocean distribution of specific West Coast salmon stocks, which if proven effective, may allow fishermen to better access relatively abundant stocks of salmon while protecting weak stocks. In addition, these proposals will test the feasibility of new techniques that may allow real-time stock-specific quota management in limited areas and times.

GSI technology for identifying Chinook stocks is developed to the point where it can be useful for fishery management. However, the successful application of this technology to management has many aspects beyond simply the identification of stocks. Considerable preliminary work in 2006 toward implementation of this technology has been done in pilot projects in California, Oregon, and Washington. In addition, GSI has been successfully used in Canadian fisheries, but tracking only one stock in a much more limited geographic scope than will be necessary for Pacific Fishery Management Council (Council) managed salmon fisheries. Proposed work for 2007 would be designed (1) to extend the development of techniques and methodologies based on the 2006 experience, (2) involve fishermen in sampling programs, and (3) learn more about the distribution of Chinook stocks. In addition, we propose consideration of a limited test of a potential management application.

Current projects in Oregon and California are developing techniques for sampling and analysis. For example, the Oregon project has successfully collected data on the specific location, time, and depth of capture of individually identified Chinook salmon in the commercial troll fishery. In 2007, there are plans to apply these techniques more widely in order to gain experience with the methodology and to test its usefulness to answer some basic questions for fisheries management. Restricted fishing opportunities, similar in scope to the 2006 season, are expected in 2007, and this may limit our ability to advance development of GSI applications to fishery management. As a result, it would be useful to consider an exempted fishing permit (EFP) to allow limited commercial and recreational salmon fishing for the purpose of obtaining adequate sample sizes and testing specific fishing patterns in space and time. Impacts may be minimized in some fisheries through catch and release requirements.

There are three components to this proposal:

- 1) Testing feasibility of real-time quota management -- A small-scale pilot management approach could be designed to determine the actual harvest of KRFC and other species of concern during the season using GSI in one or more limited areas along the coast of northern California and southern Oregon. Existing harvest models would be used to determine an allowable quota for the weak stocks. Fishers would collect GSI samples along with time and location-specific data on their catch. Actual impacts would be determined using near-real-time GSI analysis. This may involve periodic closures (e.g., closed four days per week) to allow time for data analysis and notice of management actions. Cumulative impacts would be tracked with the intent of allowing fishing on healthy stocks to proceed without exceeding predicted impacts on stocks of concern such as KRFC.
- 2) Testing inside/outside differential in KRFC impacts -- Spatial distribution of catch samples from the fishery could be analyzed to test the hypothesis that KRFC are disproportionately distributed offshore. This has been proposed in the past, but there is insufficient data collected from investigations with a strong experimental design. Current CWT data, aggregated by area of catch, have insufficient spatial resolution to resolve this question. The observation has been that recreational fisheries tend to have lower KRFC impacts than commercial fisheries in the same time and area. This, combined with the observation that recreational fisheries tend to occur closer to shore than commercial fisheries, has led to the distribution hypothesis. It may be necessary to have fishers fish in areas where they would not routinely fish (i.e., commercial trollers in inside areas) to conduct an adequate test. It also may be necessary to employ both recreational and commercial fishers to determine if there is a stock impact differential between the two fishing segments that are independent of spatial distribution. This may need to be repeated over several seasons and/or in several areas before it can be applied to management.
- 3) Improving information on spatio-temporal distribution of west coast salmonids -- As resources allow, we propose to continue collecting time- and location-specific genetic samples from open-season fisheries, along with scales, otoliths, stomachs, and oceanographic data. The purpose of these collections would be to begin developing a database of stock distributions for comparison with the historical CWT data base. This component would not have a direct impact on 2007 fisheries, but active participation by fishermen would benefit this portion of the study. It would be part of an ongoing process that could inform managers in future years. If funds and fishery impacts are available the sampling could be extended to closed times and areas in order to collect more spatially comprehensive data. It would also be necessary to sample in areas that would not normally be fished, even during open seasons. This component of the project includes development and testing of a statistical sampling design.

Maximizing the benefits of the technology will require consideration of alternative strategies. There will be several constraints that will have to be considered in developing a plan that will likely involve some mix of the above described components. There will be logistical constraints related to collecting and processing samples, there will be cost constraints, and there will be constraints related to available impacts to KRFC or other weak stocks. The latter point will

require consideration of how much of the sampling and development work will be integrated with the existing fishery as opposed to that which may need to be implemented through an EFP. Although KFRC may be the primary focus for this effort, the sampling plan will also have to consider the effect on other weak stocks.

Use and implementation of GSI methods in 2007 will likely require Council approval through the salmon methodology review process, with approval scheduled for the November 2007 Council meeting. In order to provide for the necessary review, a complete proposal with sufficient detail would have to be complete for review by the joint Salmon Technical Team/SSC Salmon Subcommittee Panel, which will meet October 10, 2006.

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